CHAPTER 1

SEEKING NEWER WORLDS: AN HISTORICAL CONTEXT FOR SPACE EXPLORATION

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Come, my friends,
Tis not too late to seek a newer world
—Tennyson, "Ulysses," 1842

Nearly 40 years ago, William Goetzmann, in his Pulitzer-winning *Exploration and Empire*, argued that explorers were "programmed" by their sponsoring societies. They saw what they were conditioned to see, and even novelty fell within a range of expected "curiosities" and "marvels." What is true for explorers has been no less true for exploration's philosophers, historians, and enthusiasts. Pundit and public, commentator and scholar, all have become accustomed, if not programmed outright, to see exploration and space as inseparable. Space has become the new frontier; exploration, if it is to thrive, must push to the stars; the solar system is where, in our time, exploration is happening.[1]

Since Sputnik, no survey of exploration has not looked heavenward, and no advocate for space adventuring has failed to trace its pedigree through the lengthening genealogy of the Earth's explorers. But in the particulars they differ; this field, too, has its "lumpers" and "splitters." The lumpers consider the long saga of geographic exploration by Western civilization as continuous and thematically indivisible. The Viking landers on Mars are but an iteration of the long ships that colonized Greenland. The *Eagle*, the Command Module orbiter, and Saturn V rocket that propelled the Apollo XI mission to the Moon are avatars of Columbus's *Niña*, *Pinta*, and *Santa Maria*. The "new ocean" of planetary space is simply extending the bounds of the old. The ur-lumpers would go further. The historic eruption of European exploration was but the most recent device to carry humanity's expansive hopes and ambitions;

1. William H. Goetzmann, *Exploration and Empire* (New York: Knopf, 1966).

its origins reside in the genetic code of humanity's inextinguishable curiosity. Even more, space exploration shares an evolutionary impulse. Through humanity, life will clamber out of its home planet much as pioneering species crawled out of the salty seas onto land. The impulse to explore is providential; the chain of discovery, unbroken; the drivers behind it, as full of evolutionary inevitability as the linkage between DNA and proteins.

The most prominent have generally boosted space exploration as necessary, desirable, and inevitable. The argument assumes the form of a syllogism: The urge to explore is a fundamental human trait. Space travel is exploration. Therefore, sending people into space is a fundamental characteristic of our species—what more is there to say? The only impediment to the past serving as prologue to the future is imagination, as translated into political will, expressed as money. From Carl Sagan to Ray Bradbury, such advocates have self-admittedly been fantasists, whether they argued that the motivating vision is embedded in our genes or our souls. But the urge, the motivating imperative, they place within the broad pale of *Homo sapiens sapiens.*[2]

Yet humanity doesn't launch rockets; nations do. So there exist also among the spacefaring folk special themes that place interplanetary exploration within the peculiar frame of a national experience. In particular, there exist groups for whom extra-Earthly exploration is a means to perpetuate or recreate what they regard as the fundamental drivers of American civilization. Space exploration offers the chance to discover another New World and to erect a New America, a technological New Jerusalem, beyond the tug of the Earth's gravitational field and the burdens of its past. Only a New Earth can save the Old. Space colonization would remake William Bradford's vision of Plymouth Plantation into a very high-tech city and transplant it to a very distant hill.[3]

Still, a countercase exists. What expands can also collapse. Ming China launched seven dazzling voyages of discovery and then shut down all foreign travel and prohibited multimasted boats. Medieval Islam sponsored great travelers before shrinking into the ritual pilgrimage of the hajj. The Norse spanned the Atlantic, then withered on the fjords of a new world. Moreover, plenty of peoples stayed where they were: they lacked the technological means, the fiery incentives and desperate insecurities, or the compelling circumstances to push them to explore beyond their homeland. Like Australia's Aborigines, they were content to cycle through their ancestral Dreamtime and felt little

2. Examples among the celebrity celebrants might include Carl Sagan, *Cosmos* (New York: Random House, 1980); Ray Bradbury et al., *Mars and the Mind of Mind* (New York: Harper and Row, 1973); and Arthur C. Clarke, *The Exploration of Space* (New York: Harper, 1959).

3. See, as an extreme example, Robert Zubrin, *The Case for Mars* (New York: Touchstone, 1996).

urgency to search beyond the daunting seas or looming peaks. A walkabout was world enough.[4]

In this perspective, what matters are the particulars—the cultural conditions that prompt and sustain discovery. What is commonly called "geographic exploration" has been, in truth, a highly ethnocentric enterprise. It will thrive or shrivel as particular peoples choose. There is nothing predestined about geographic discovery, any more than there is about a Renaissance, a tradition of Gothic cathedrals, or the invention of the electric lightbulb. Exploration as a cultural expression is something peculiar to times, places, and peoples. General historians might site exploration within dramas of human mobility, of empires, of Europe's astonishing millennial-long expansion, and its equally astounding almost-instantaneous implosion. They would grant exploration little intrinsic motivation; explorers would derive their inspiration, no less than their characteristics, from a sustaining society. They view contemporary arguments for space trekking as not grounded in historic reality but inspirational rhetoric.

From such a perspective, the exuberant era of exploration that has dominated the past five centuries, bonded to European expansion, is simply another in a constellation of cultural inventions that have shaped how peoples have encountered a world beyond themselves. It will, in time, pass away as readily as the others; European-based exploration may yet expire, even after 500 years, perhaps exhausted like the cod fisheries of the Grand Banks. The history of exploration bears little similarity to the simplistic narrative of triumphalists. Historians, litterateurs, humanists, and a significant fraction of ordinary citizens may wonder why a chronicle of past contacts, particularly when burdened by imperialism and inflated by tired clichés, should argue for doing more. The record suggests that future worlds will be corrupted as old ones were. The much-abused Earth is world enough. Space exploration may prove to be a defiant last hurrah rather than a daring new departure.

To date, the lumpers have commanded the high ground of historical interpretation and historiography. Dissenters are few, and even they accept space travel's exploring pedigree. Scholarship has hardly begun to parse exploration's long chronicle to understand what features might apply or not apply to the Space

4. For a good discussion of the Norse traverse across the Atlantic, see Carl Sauer, *Northern Mists* (Berkeley: University of California Press, 1968). Studies of the Chinese voyages have become a minor cottage industry; see, for example, Gavin Menzies, *1421: The Year China Discovered the World* (New York: Bantam, 2002). On the Islamic eucumene, see Richard Hall, *Empires of the Monsoon: A History of the Indian Ocean and Its Invaders* (London: HarperCollins, 1996). The Polynesian voyages are the subject of endless retellings; an early, defining work is Peter Buck, *Vikings of the Pacific* (Chicago: University of Chicago Press, 1959).

Age. Does the Apollo program resemble Columbus landing in the Bahamas, or the abortive Greenlanders at Vinland? Does Voyager mimic Captain James Cook's circumnavigating sallies, or Roald Amundsen's small-craft threading of the Northwest Passage? Is Mariner a robotic version of Lewis and Clark, leading America to its new westward destiny, or a Zebulon Pike, whose expeditions south led him to a Mexican jail and whose forays north left him dead outside a Canadian fort? The history of exploration is so complex that one can find whatever anecdote and analogy one wants.

How one identifies the exploratory character of space depends on how one interprets the enterprise—whether space travel is primarily about technology, science, adventure, geopolitics, or inspiration. Each theme can lead to its own history. For space as exploration, however, two clans dominate the discourse: space enthusiasts eager to trace the genealogy of exploration from ancient times to contemporary launch sites, and historians anxious to push their erstwhile narratives into today's news. The two display a kind of symmetry, a yin and yang of emphasis. Space enthusiasts tend to condense exploration prior to the mid-20th century into a lengthy prelude, while historians of exploration—there aren't that many—update their chronicles to include space endeavors into a kind of coda. The common assumption is that space is of course exploration, so there is little need to explain how and why. One only needs enough of the past to boost the narrative into orbit, or enough contemporary events to predict the narrative splashdown. Instead of analysis, the ur-lumper rhetoric tends to conflate a cascade of themes: intellection with exploration, exploration with contact, contact with colonization, colonization with human settlement.

Of course there are exceptions; the best scholarship usually is. A good example of exploration considered from the perspective of space is Richard S. Lewis's *From Vinland to Mars: A Thousand Years of Exploration.* The Space Age, he concludes, "can be defined reasonably as the modern extension of a process of exploration that began a thousand years ago with the Norse voyages to Greenland and North America." The common motivator was "intraspecific competition," the deadly contest "among men and families for land, among nations for power and wealth." This persistent trait could yet "carry future generations to the stars." Lewis devotes 100 pages to exploration prior to 1957 and 300 from the International Geophysical Year (IGY) to the Viking landings on Mars. Like most lumper historians, he came to space themes by way of journalism.[5]

5. Richard S. Lewis, *From Vinland to Mars: A Thousand Years of Exploration* (New York: Quadrandle, 1976), pp. xi, xii.

Scholar historians, by contrast, are likely to carve up the long chronicle into more manageable units. Unquestionably, the outstanding practitioner is William H. Goetzmann. Building on J. C. Beaglehole's scholarship on Captain Cook and the exploration of the Pacific generally, in which Beaglehole argued that the voyages constituted something new, a renewal of global exploration, Goetzmann has elaborated the concept of a Second Great Age of Discovery, which he believes has not yet ended, which extends unbrokenly into space, and which has fundamental valences with America. "Just as in the Renaissance," he writes, "a New Age of Discovery began—born of competition between men and nations, dependent alike on abstract theory, applied science, now called 'engineering,' visionary imagination and the faith of whole cultures who invested billions of dollars or rubles in the great adventure out into the frontier that President John F. Kennedy called 'this new ocean.'" The undertaking has special resonance for the United States, for "America is the product of an Age of Discovery that never really ended. From the Viking voyages in the 10th century to the lunar voyages of the twentieth, much that is held to be American derives from a sense of the ongoing and complex process of exploration that has made up so much of its history." The explorer, Goetzmann concludes, "stands as a kind of archetypal American."[6]

Even so, Goetzmann, ever the scholar, concluded that the ultimate payoff lay in the realm of knowledge, particularly the peculiar moral understanding that helps us understand who we are and how we should behave. In explicating that understanding, Goetzmann, always the historian, chronicles exploration against the "constant imaginative redefinition of America." In that sense, "America has been almost anything its explorers or their 'programmers' wanted it to be at the time. And yet constant discoveries and rediscoveries have continually changed the meaning of the country for its citizens." Thus, "to many," by implication himself included, the analogy of Apollo to Columbus "seems false." Rather, "what Armstrong and Aldrin and all their heroic space predecessors have revealed is not a series of new worlds for escape and habitation, but a profounder knowledge of the earth's true place in the universe. They have changed once again the entire perspective of the globe and man's place on it." Yet Goetzmann, author of a trilogy of books on American exploration, never included space exploration in those volumes, save allusively in a preface.[7]

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6. J. C. Beaglehole, *The Exploration of the Pacific*, 2nd ed. (Stanford: Stanford University Press, 1966); William H. Goetzmann, "Exploration's Nation. The Role of Discovery in American History," in *American Civilization: A Portrait from the Twentieth Century*, ed. Daniel J. Boorstin (New York: McGraw-Hill Book Co., 1972), pp. 36, 25.

7. Goetzmann, "Exploration's Nation," pp. 33, 36.

And then there are those for whom space is continuous not merely with exploration but with evolution, for whom the Space Age represents a quantum leap in human existence. The nuances of geographic discovery's changing technologies, beliefs, lore, institutions, and personalities become mere background noise, the junk genes of history. Most practitioners come from literature or natural science, an odd couple joined by conviction and pulp fiction rather than formal scholarship. History is a loose jumble of anecdotes, like oft-told family stories or the sagas of the clan. For them, the future is what matters. What preceded contact is only preamble. What follows will be, in Arthur C. Clarke's words, childhood's end.

Regardless, no one questions the linkage of space with exploration. Their analysis of what that bond is, and what benefits the country might derive, vary. Exploration remains a means to other ends. The recent report of the President's Commission on Implementation of United States Space Exploration Policy described the goal of the "vision" as "to advance U.S. scientific, security, and economic interests . . . ," and not least national prestige. More realistically, at the time Mariner orbited Mars, Bruce Murray observed simply that "we are exploring," that the "very act of exploration is one of the more positive achievements open to a modern industrial society," that space exploration is "as important as music, art, as literature," that it is "one of the most important long-term endeavors of this generation, one upon which our grandchildren and great-grandchildren will look back and say, 'That was good.'" But if space exploration is a cultural enterprise, then it should be examined as such, subject to the same tangible criteria.[8]

All this suggests ample opportunity for future research. There is, first, a place for dedicated analysis beyond the selective anecdote, heroic narrative, and flimsy analogizing. There is little empirical heft, even less quantitative data, and sparse scrutiny of what, exactly, exploration has meant in terms of economics, politics, ethics, knowledge, fiction, and the like. Serious scholarship has not tracked exploration to the extent it has related fields such as the history of physics, military history, government institutions, or even the literature of the western hero. The founding saga of the Great Age of Discovery, Luis de Camões's *Lusiadas*, is, after all, a tragedy, brooded over by the Old Man of Belem, who declaims its debased origins: the enterprise to the Indies will turn out badly, though it cannot be stopped. By the time we arrive at the Space Age, "literature" has come to mean Edgar Rice Burroughs and the imagination of nine-year-old boys. A similar declension seems to affect the scholarship.

8. Report of the President's Commission on Implementation of United States Space Exploration Policy, *A Journey to Inspire, Innovate, and Discover* (Washington, DC: Government Printing Office [GPO], June 2004), p. 11; Bruce Murray, quoted in Ray Bradbury et al., *Mars and the Mind of Man*, pp. 24–25.

A part of this general task is comparative study. We know things in the context of other things. We will understand contemporary exploration better if we arrange suites of comparisons with past efforts, understanding their common elements, isolating what features make them similar or different. But this exercise should not be restricted to exploration, comparing itself in various eras. If expeditions are a cultural creation, then they should be compared as well with other undertakings, perhaps with opera, baseball, publishing, art museums, extreme sports. Exploration is not the only way by which a society can express its restlessness or exercise its curiosity. A society must choose to explore. What is the basis for that choice and how does the outcome compare with other choices?

Of particular value to Americans is the need to segregate exploration from colonization. American accounts of the Space Age almost invariably begin with the discovery of North America, preferably by the Norse. This is teleological history: the point, the conclusion, of exploration was to find a New World and, subsequently, to found the United States. The epic of America is its expansion westward. When exploration completed its survey of America, it had to continue elsewhere, to the Poles, for example, and then to planetary space, or else that epic would end. It makes a wonderful national creation story. It works less well as scholarship. The exploration of America was part of a global project, rising and falling with those same geopolitical tides. So it is proving to be with space.

I confess to being a splitter. This is a minority viewpoint without much of a clientele; it may be a singularity. My premises are these: that exploration as an institution is an invention of particular societies; that it derives much of its power because it bonds geographic travel to cultural movements, because it taps into deep rivalries, and because its narrative conveys a moral message; that, while unbroken, the trajectory of a half millennium of exploration by Western civilization can be understood best by parsing its long sweep into smaller increments; and that the future of exploration may become a reversed mirror image of its past. In particular, my splitter history would partition the past half millennium of European exploration from humanity's various migrations, and it would then fraction that grand chronicle into three great ages of discovery, fissioning William Goeztmann's Second Great Age of Discovery into two, adding a Third Age as distinctive from the Second as the Second was from the First.

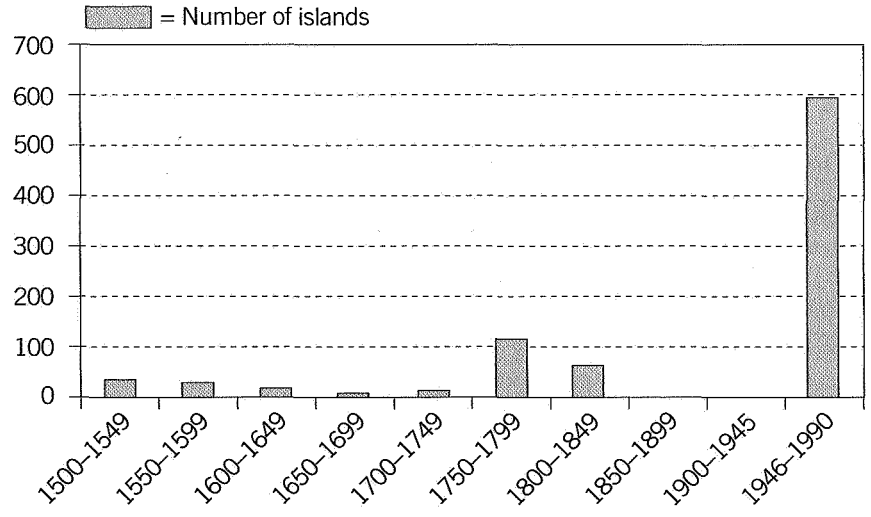
This is not a commonly held analysis, not least because it compels us to examine differences. It demands that we identify what segregates space exploration from its progenitors beyond exalted claims that, in leaving the Earth's gravitational pull, humanity is, at last, leaving its nest. It places space exploration with the exploration of Antarctica and the deep oceans. It suggests a future that will less resemble the near past than the deep past. The Space Age is different; the Space Age is the same. A splitter history asks, how? and what does it mean? My version of a sample such history follows.

ISLANDS IN THE MIST: THE CASE FOR AGES OF DISCOVERY

Why *three* eras? Why not four, or eight? Why any at all? History is messy, and exploration history, with its perpetual disputes over prediscoveries and rediscoveries, messier still. So consider, as an index of exploration, the case of Pacific islands. None were known empirically to Europe prior to the Great Voyages. While some discoveries, particularly by the Portuguese, were no doubt hoarded as state secrets, the dates of discovery for most are reliably known. Plotting those discoveries by 50-year increments yields three fairly distinct periods (see figure below).

The first coincides with the classic voyages of discovery, led by Portugal from the west and Spain from the east. Every island is new: discovery is rapid and relatively easy (if anything done by ship in those days can be considered easy). Between 1500 and 1550, mariners discovered some 32 islands. They found fewer in the next 50 years, and half as many again in the next 50. By the mid-17th century, the long wave has exhausted itself. Some 75 percent of the discoveries occurred over roughly 75 years.

Discovery of Pacific Islands[9]



9. Data from Henry Menard, *Islands* (New York: Scientific American, 1986).

An explanation for the odd curve, a peak followed by a rapid decay, is simple. Mariners were not searching for islands, but for routes to the great entrepôts of the East. They found islands along the way, and once they plotted out the best paths, they had scant incentive to keep at sea. The latter discoveries happened from miscalculations or accidents—storms, for example, that blew ships off course—or, as the Dutch became more expansive in their plans to outflank the Portuguese, a scattering of islands that they chanced upon. There was no reason to randomly rove the seas. Explorers had completed their task, had hewed routes to the riches, and the discovered islands had been, as it were, the chips that scattered to the side.

Then, in the mid-18th century, after nearly 150 moribund years, the process rekindled: Europeans begin encountering new islands. But these are new Europeans—British and French, mostly—entangled in fresh rivalries, and they have novel purposes. They come as emissaries of the Enlightenment; they are keen to explore nature's economy for its exotic wealth and commercial wonders; they carry naturalists eager to catalog the Great Chain of Being, trace the contours of the world ocean, and draft a new *mappa mundae*; and they haul artists and litterateurs avid for lush tropical utopias. They search out the blank spots of the Pacific. They seek unknown islands as ends in themselves. A great age of circumnavigators commences, of which the three voyages of Captain James Cook are a prime exhibit.

The number of known islands explodes. More islands are discovered in 70 years than in the previous three centuries. But this, too, quickly expires. They reach the last island, Midway, in 1859. Then nothing, and it is a nothing all the more profound because the voyagers have revealed all that exist. By the onset of the 20th century, not only have explorers exhausted the dominion of Pacific islands, the Enlightenment itself has begun to crumble before the intellectual tremors and metaphysical termites of Modernism. For the Pacific Ocean, a second age of exploration ends with traffic in guano and copra; excursions by tourists, adventurers, and anthropologists; and color prints by Gauguin.

How, then, might there be another era? Because mariners went below the deep swells; they traveled by submarine and surveyed the hard-rock topography of the deep ocean by remote sensing devices. They discovered a vast realm of volcanic islands—guyots—that had eroded and subsided beneath the surface. In a few brief decades, an exploring science mapped 596 new Pacific isles. These were more Pacific islands than Western civilization had discovered since Vasco da Gama first landed Portugal at the gates of the Indies. More powerfully, the context of discovery revived with another global rivalry, this one begun in World War II and accelerated during the Cold War; with another intellectual syndrome, the curious culture of Modernism; with another revolution in technology.

The Cold War competition beneath the waves complemented almost perfectly the better-known competition for the high ground beyond the Earth's atmosphere. Space exploration was part and parcel of this same Third Great Age of Discovery. If islands are a reliable index, three eras might equally characterize the vast sweep of Western exploration since the natal times of Henry the Navigator. If space, however, becomes a powerful enough presence, then the Eurocentric frame itself might need resetting and another index might in time be necessary. Perhaps discovered moons might replace encountered isles, although it's hard to imagine a future artist rendering Titan or Europa with the lavish cultural colorations that William Hodge, traveling with Cook, brought to Tahiti.[10]

GREAT VOYAGES: THE FIRST AGE

The Great Age of Discovery opened with centuries of false dawns. Part of the difficulty is disentangling exploration from other forms of travel: from migration, walkabout, exile, wars of conquest, trading expeditions, reconnaissance, long hunts, great treks, missionizing, pilgrimage, tourism, and just plan wanderlust. Roman merchants had contact with the Canaries and Cathay. European pilgrims trekked from Hibernia to the Holy Land. Franciscan scholars trudged to the court of the Great Khan. Each age of expansion, every expansionist people, experienced a burst of discovery about a wider world. What made events of the 15th century special was that these exploring contacts did not end in a rapid contraction. They became welded to a revived expansion of Europe that would stretch over half a millennium; they bonded with revolutionary epochs of learning and political reform. They became institutionalized. Exploration became the outward projection of internal unrest that would not let the momentum long languish.[11]

The Great Voyages began cautiously enough. That Portugal pioneered the practice should alert us to the process's uncertain origins and its often desperate character. There was little in Portuguese history from which someone might predict, in 1450, that it would leap across whole seas and over unknown continents, establish the world's first global empire, and create the raw template

10. To match the discovery of Pacific islands with the general swarm of exploration, consult standard references. A sprawl of atlases exist that trace the general contours of geographic exploration, for example, and there is the flawed but indispensable *A History of Geographical Discovery and Exploration*, by J. N. L. Baker (New York: Cooper Square Publishers, 1967).

11. The doyen of the founding Age of Discovery is J. H. Parry. Among his many works, three are especially informative as syntheses: *The Establishment of the European Hegemony, 1415–1715*, 3rd ed., rev. (New York: Harper and Row, 1966); *The Discovery of the Sea* (Berkeley: University of California Press, 1981); and *The Age of Reconnaissance: Discovery, Exploration, and Settlement, 1450–1650* (New York: Praeger, 1969).

for European expansion. Yet that is precisely what happened. For several hundred years, exploring nations sought to emulate the Portuguese paradigm, whose outposts survived until the 21st century. Within a generation, it came to be said that it was the fate of a Portuguese to be born in a small land but to have the whole world to die in.

What happened was that exploration became—directly, or indirectly through charters—an organ of the state, and because no single state dominated Europe, many joined the rush. Geographical exploration became a means of knowing; of creating commercial empires; of outmaneuvering political, economic, religious, and military competitors—it was war, diplomacy, proselytizing, scholarship, and trade by other means. For this reason, it could not cease. For every champion, there existed a handful of challengers. This competitive dynamic—embedded in a squabbling Europe's very fabric—helps explain why European exploration did not crumble as quickly as it congealed. On the contrary, many Europeans absorbed discovery into their culture, even, in some cases, writing explorers into a founding mythology, a cultural creation story. In short, where exploring became a force, something beyond buccaneering, it interbred with the rest of its sustaining society. The broader those cultural kinship ties, the deeper the commitment. Societies dispatched explorers; explorers reshaped society. Exploration became an institution. The explorer became a role.

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The fabled Great Voyages announced a First Age of Discovery. Its particular domain was the exploration of the world ocean, the discovery that all the world's seas were one, that it was possible to sail from any shore and reach any other. Of course, there were some grand *entradas* in the Americas, and missionaries, Jesuits especially, penetrated into the vast interiors of the Americas, Africa, and Asia. But as J. H. Parry observes, it was the world sea that defined the scope and achievements of the First Age. The mapping its littoral was the era's finest cartographic triumph.[12]

The map reminds us that the First Age coincided with a Renaissance. The era unveiled two new worlds: one of geography, another of learning. Francis Bacon conveyed this sense perfectly when he used as a frontispiece to his *Great Instauration* the image of a sailing ship pushing beyond the Pillars of Hercules. The voyage of discovery became a metaphor for an age of inquiry that would venture far beyond the dominion of the Mediterranean and the inherited wisdom of the ancients. The discoveries overwhelmed a text-based

12. Parry, *Discovery of the Sea.*

scholarship: scholasticism, that arid discourse that resulted from too many scholars and not enough texts, collapsed as new information poured into Europe like New World bullion into Spain and, like it, inspired an inflationary spiral of knowledge.[13]

An age of discovery, however, demands more than curiosity and craft. It has to speak to deeper longings and fears and folk identities. The ships must voyage into a moral universe that explains who a people are and how they should behave, that criticizes and justifies both the sustaining society and those it encounters. The Great Voyages provided that moral shock: they forced Europe to confront beliefs and mores far beyond the common understanding of Western civilization. The Renaissance expansion of Europe profoundly altered Europe's understanding of itself and its place in the world. There was plenty of hollow triumphalism, of course, but those contacts also inspired Montaigne's celebrated preference for the cannibalism of Brazil's noble savages to that of Versailles's courtiers, and Las Casas's excoriating denunciation of the *conquistadores*. They compelled a reexamination of the political and ethical principles underlying Christendom and its secular principalities. Exploration could upset the discovering society as well as the discovered. It often found things it didn't like, not least things about itself. The dark regions held horrors as well as marvels.

For all this, the Portuguese were the originators. If exploration became, as Goetzmann argues, programmed, then the Portuguese paradigm was the template, the default setting for exploration's software. The degree of interpenetration between exploration and society was astonishing, of which the suite of exploring ships was only a down payment. Consider the founding explorers: Henry the Navigator, late-medieval prince, blurry-eyed speculator, and wastrel, who began the fusion of discovery with state policy; Vasco da Gama, merchant and administrator, representing the bonding of commerce with the state; Afonso de Albuquerque, soldier and strategist, seizing at gunpoint the critical nodes of traffic throughout the Indian and South China seas; St. Francis Xavier, tempering the sword with the cross, missionizing in India, the East Indies, and especially Japan, with plans to proselytize in China; and Luis de Camões, adventurer turned litterateur, author of the epic *Os Lusiadas* (1572), which cast contemporary explorers into the mode of classical heroes. Together they embodied, literally, the swirl of Renaissance ambitions—God, gold, glory—while wrapping it in an enduring saga. "Had there been more

13. This has long been a common theme. A somewhat eccentric but insightful (and lively) recreation of what it meant can be found in William Manchester's *A World Lit Only by Fire: The Medieval Mind and the Renaissance: Portrait of an Age* (Boston: Little, Brown, 1992), which tracks the imaginative impact of Magellan's voyage.

of the world," Camões wrote, his bold mariners "would have discovered it." Revealingly, all the founders died overseas.[14]

When this tidal bore of discovery passed, it left an institutional berm throughout the strands on every continent save Australia and Antarctica. Portuguese explorers and fishermen plied the Grand Banks and probed the shorelines of North America and the North Atlantic isles. They established colonies in Brazil. They held trading fortresses along the coast of Africa and India, in the Spice Isles, Cape Verde, St. Helena, Tristan da Cunha, and at such major trading entrepôts as Malacca, Macau, and Nagasaki. Probably they had reached Australia, though they found nothing to hold them. Those who followed were interlopers, seeking to poach parts of an empire too vast for tiny Portugal to hold. Or they sought to outflank the Portuguese. That was surely the intention of Christopher Columbus, who after all had learned his mariner's craft sailing on the Portuguese Atlantic circuit. And that was the prospect held by Magellan, who had already been to the East Indies in service to Portugal before, on Columbus's example, he offered fealty to Spain.[15]

The Portuguese paradigm pointed as well to the enormous liabilities inherent in geographic discovery. The overseas posts, never fully staffed, nevertheless siphoned off perhaps a tenth of the Portuguese population. They drained the homeland without demographically overwhelming the colonies. The rapid infusion of knowledge failed to spark a Portuguese renaissance; much of the data was hoarded as a state secret, and the rest demanded an infrastructure of scholarship that did not exist. Worse, the sudden inundation of wealth proved destabilizing. It tempted rulers to indulge personal and geopolitical fantasies, typically expressed as foreign wars. The unwisely sainted Henry was here the prototype. What wealth he gleaned, he sank in futile fighting on Moroccan sands. Exploration could led to profitable colonization where the discovered place was uninhabited, as at Madeira. Where lands were already occupied, colonization led to extravagant wars and bottomless expenses. The paradigm thus had its paradox: exploration required money as well as will, but beyond sacked towns and coastal trade, there was little wealth to get from it. Once permanent, the colonies became not sources of sustainable wealth, but economic placers, quickly

14. Even in English, the Portuguese experience looms large. In addition to Parry, see C. R. Boxer, *The Portuguese Seaborne, 1415–1825* (London, Hutchinson, 1969), and *Four Centuries of Portuguese Expansion, 1415–1825: A Succinct Survey* (Johannesburg: Witwatersrand University Press, 1965), as well as Bailey W. Diffie and George D. Winius, *Foundations of the Portuguese Empire, 1415–1580* (Minneapolis: University of Minnesota Press, 1977). Luis de Camões's epic, *The Lusiads,* is translated by Leonard Bacon with an introduction and notes (New York, Hispanic Society of America, 1950).

15. On the Dutch strategy, see C. R. Boxer, *The Dutch Seaborne Empire, 1600–1800* (New York, Knopf, 1965).

plundered, before plummeting into fiscal sinks. An exploring imperium proved easier to grab than to hold.[16]

The Portuguese paradigm should remind us how much geographic exploration has morphed over the centuries. By the late 18th century, as motivating forces, science had replaced God; commerce, gold; and national prestige, individual glory. The issues are even more serious for space exploration, although America's spacefaring traverse through the solar system may be the closest geographic romp comparable in scale to Portugal's. But there the similarities cease. Pioneer did not have to force access to the outer planets by the sword, Mariner did not have to proselytize, and Voyager did not have to wrestle with restless indigenes and obstreperous crews. Instead of Camões, American letters had Norman Mailer and Ray Bradbury, neither of whom had been in space, and instead of classic heroes, Renaissance versions of Odysseus, we had Tom Wolfe's test pilots, forever fretting about drinking and screwing and their ranking on the ziggurat. No one wrote about the vessels themselves, any more than the 16th century did about the *Victoria*. Mostly, Portugal's voyages were a prelude to imperium, an extension of ancient empire-building by new means. America's probes were valenced to the limited conflict of the Cold War. If Portugal faltered, someone else would move in. If America stalled, the void might widen.

CORPS OF DISCOVERY: THE COMING OF THE SECOND AGE

The inflection to what William Goetzmann has termed a Second Great Age of Discovery was messier than the paradigm of Pacific islands suggests. Yet the same basics apply. By the early 18th century, exploration had become moribund; mariners did more poaching and piracy than original probing, like William Daumpier more buccaneer than naturalist; the explorer blurred into the fantasist and fraud, the promoters of the Mississippi and South Seas bubbles, the Lemuel Gulliver of Jonathan Swift's savage satire, or with the forlorn adventures of Daniel Defoe's Robinson Crusoe, who curses a woeful addiction to adventuring that repeatedly brings him to grief. Exploring expeditions persisted largely because interlopers tried to outflank established competitors, but little new was added. Exploration seemed destined to be left marooned on the shore of a fast-ebbing historical tide.[17]

Then the cultural dynamics changed. The long rivalry between Britain and France, the penetration of high culture by the Enlightenment, a hunger for

16. Peter Russell, *Prince Henry "the Navigator": A Life* (New Haven: Yale University Press, 2000). In fact, all the standard accounts of the Portuguese eruption, even the most celebratory, relate the same sad decline.

17. See William H. Goetzmann, *New Lands, New Men: The United States and the Second Great Age of Discovery* (New York: Viking, 1986).

new markets, all combined to move Europe again out of dry dock and onto the high seas of exploration and empire. Naturalists lengthened their excursions; artists painted natural scenes; *philosophes* looked to pure nature for guidance. The Grand Tour became a global excursion around the Earth. Perhaps most extraordinarily, the missionary emerged out of a secularizing chrysalis into the naturalist. Increasingly, scientists replaced priests as the chroniclers and observers of expeditions, and scientific inquiry substituted for the proselytizing that had helped justify an often violent and tragic collision of cultures.[18]

From Linnaeus's apostles gathering the fruits of nature from the Americas to Antarctica, to expeditions measuring the arc of the meridian and the transit of Venus, explorers swarmed across the Earth and often sailed around it. Over the next century, every aspiring great power dispatched fleets to seek out new wealth and knowledge, to loudly go where others had not yet staked claims. Cook, Vancouver, Bougainville, LePerouse, Wilkes, Bellingshausen, Malaspina—these became the Magellans of the Enlightenment. They placed the competition intrinsic to science into the service of geopolitical strife. Once again, the rivalries among the Europeans were as great as anything between Europeans and other peoples. A civilization's internal conflicts drove its outward expressions.

In the process, the old motivations became secularized and updated. In petitioning the Lords Commissioners of the Treasury to support the 1761 transit, the Royal Society of London laid out the new rationales for systematic discovery:

> The Memorial itself plainly shews, that the Motives on which it is founded are the Improvement of Astronomy and the Honour of this Nation [an Englishman, Edmund Halley, had proposed the transit as a means of measuring the astronomical unit] . . . . And it might afford too just ground to Foreigners for reproaching this Nation in general (not inferior to any other in every branch of Learning and more especially in Astronome); if, while the French King is sending observers . . . not only to Pondicherie and the Cape of Good Hope, but also to the Northern Parts of Siberia; and the Court of Russia are doing the same to the most Eastern Confines of the Greater Tartary; not to mention the several Observers who are going to various

18. The classic figure, of course, is James Cook, so see J. C. Beaglehole's classic (if exhaustive) biography, *The Life of Captain James Cook* (Stanford, CA: Stanford University Press, 1974). But see also the impact of Linnaeus in *The Compleat Naturalist; a Life of Linnaeus* (New York: Viking Press, 1971), by Wilfrid Blunt, with the assistance of William T. Stearn, and see the impact of Banks, a critical catalyst for whom Patrick O'Brian offers a popular biography, *Joseph Banks: A Life* (London: Collins Harvill, 1987). The literature on all these men and their apostles and imitators is almost oceanic in its extent.

> Places, on the same errand from different parts of Europe; England should neglect to send Observers to such places . . . subject to the Crown of Great Britain.
>
> This is by foreign Countries in general expected from us; Because the use that may be derived from this Phaenomenon, will be proportionate to the numbers of distant places where . . . observations . . . shall be made of it; And the Royal Society, being desirous of satisfying the universal Expectations of the World in this respect have thought it incumbent upon them . . . to request your effectual intercession with His Majesty . . . to enable them . . . to accomplish this their desire . . . which . . . would be attended with expense disproportionate to the narrow Circumstances of the Society.
>
> But were the Royal Society in a more affluent State; it would surely tend more to the honour of his Majesty and of the Nation in general, that an Expense of this sort, designed to promote Science and to answer the general Expectation of the World, should not be born by any particular Set of Private Persons.[19]

Here, in a nutshell, were the formal reasons for state sponsorship: society needed science; science needed exploration; exploration to far countries needed support beyond what individuals could contribute; international scholarship and national honor demanded participation. Unsaid, but indispensable, were the rising popular enthusiasms for geographic discovery, bonded not to reason but to sentiment. The Lacondamine expedition to Ecuador commanded public attention not for Lacondamine's meticulous mapping of the Amazon's latitude and longitude, but for Isabella Godin's heart-wrenching journey down it to find her husband. Public interest widened. By the latter part of the 18th century, as select colonies moved from the littoral inland, wider populations found in explorers a Moses-like leader of the people to promised lands. Daniel Boone, not George Washington, for example, would become America's folk-epic hero. From high culture to pop cult, the explorer claimed cultural standing.[20]

Those grand circumnavigations revived geographic exploration, but they mostly proved a means to reposition explorers, who promptly moved inland. The world's continents replaced the world sea as an arena for discovery: the

19. Harry Wolfe, *The Transits of Venus* (Princeton: Princeton University Press, 1959), quoted on p. 83.

20. The Lacondamine expedition is not as well known among English speakers as it should be. A good introduction, leading to the successors in South America, is available in Victor von Hagen, *South America Called Them. Explorations of the Great Naturalists: La Condamine, Humboldt, Darwin, Spruce* (New York: A. A. Knopf, 1945). A popular version has recently been published: Robert Whitaker, *The Mapmaker's Wife: A True Tale of Love, Murder, and Survival in the Amazon* (New York: Basic Books, 2004).

cross-continental traverse superseded a circumnavigation as the grand exploring gesture of the age.

The pivotal figure was Alexander von Humboldt, whose five years in Latin America redefined exploration for the era. Humboldt rewove the loose strands into a taut fabric. He projected Linnaeus's natural-history excursion into a cross section of continents. He carried the artist's Grand Tour to the New World. He put legs under Cook's tours and let them trek from the shoreline over vast landscapes. He gave empirical heft to the misty musings of *Naturphilosophie*. He empowered geographic science with a global reach. In the words of Ralph Waldo Emerson, he was one of "those Universal men, like Aristotle." While he was not the first European to paddle up the Orinoco or climb in the Andes, Humboldt was the first of a new kind of European, such that even when explorers of the Second Age revisited sites known to the First, they did so with original eyes and to novel ends. Symbolically, upon his return to Europe, he dined with Thomas Jefferson the same month that Lewis and Clark's Corps of Discovery departed St. Louis. In the person of Humboldt, the explorer embodied the Romantic hero.[21]

The transition matters because, as the 19th century ripened, Europe was no longer content to remain as a trader on the beaches of the world sea. Like its exploring emissaries, it shoved and swarmed inland. Trading ventures became imperial institutions; coastal colonies became continental nations; and the politics of commerce gave way to outright conquest. Thus commenced a grand era of exploring naturalism. New scholarship, particularly sciences, bubbled up out of the slush of specimens shipped home. The returns from the earliest explorers to a particular place were often phenomenal—the scholarly equivalent to placer mining. A revolution in geographic discovery again accompanied a revolution in learning, aptly symbolized by the simultaneous recognition by two exploring naturalists, Charles Darwin and Alfred Wallace, of evolution by natural selection.

The moral drama changed accordingly. Secularization and science translated Vasco da Gama's famous declaration that he had come to the Indies for "Christians and spices" into a cry for civilization and commerce. The deeper drama concerned that fraction of Europe's imperium colonized by European emigrants. Most of what Europe nominally ruled was densely inhabited by long-residing peoples, often in numbers far vaster than that of the rulers. But in some lands, the indigenes were swept away, and into that demographic vacuum European émigrés poured in. These settler societies tended to look

21. Probably the best biography of Humboldt is still Helmut de Terra, *Humboldt: The Life and Times of Alexander von Humboldt, 1769–1859* (New York: Knopf, 1955). For a fascinating insight into his cultural impact, however, see Halina Nelken, *Alexander von Humboldt: His Portraits and Their Artists: Documentary Iconography* (Berlin: Dietrich Reimer Verlag, 1980). On his impact in America, see Goetzmann, *New Lands, New Men.*

upon discovery as part of a national epic and to honor explorers as vital protagonists—a Moses, an Aeneas—of those founding events. With Lewis and Clark, for example, the frontiersman morphed into a naturalist, the scout into a scholar, and the adventurer into an Aeneas on his way to the founding of a new civilization. Their subsequent folk expansions proceeded hand in glove with formal exploration. These were new worlds, premised on the prospects for a new order of society. America truly was, in William Goetzmann's words, "exploration's nation," but so were Russia, Australia, Canada, and others.[22]

Discovery metastasized. As measured by the number of exploring expeditions, a slight increase appears in the latter 18th century and then erupts into a supernova of discovery that spans the globe. By the 1870s, explorers had managed continental traverses—cross sections of natural history—for every continent save Antarctica. With the partition of Africa, expeditions proliferated to assess what the lines drawn on maps in a Berlin library actually meant on the ground. Exploration had become an index of national prestige and power. The first International Polar Year (1882) turned attention to the Arctic. An announcement by the Sixth International Geographical Congress in 1896 that Antarctica remained the last continent for untrammeled geographic discovery inspired a stampede to its icy shores; even Belgium and Japan sponsored expeditions. (America's attention remained fixated on the North Pole and that other stampede to the Klondike.) Ernest Shackleton's celebrated Trans-Antarctic Expedition was, after all, an attempt to complete for that continent the grand gesture that had crowned every other.[23]

But Antarctica was the last: there were no more unvisited lands to traverse other than such backwaters as, for example, the Red Centre of Australia, the crenulated valleys and highlands of New Guinea, and the windswept Gobi. The number of exploring expeditions began to decline. Plotting them reveals the Second Age as a kind of historical monadnock, rising like a chronological volcano above a level terrain (see figure on opposite page). The peak crests in the last decades of the 19th century, as exploration crossed the summit of the Second Age. Then it began a descent down the other side.

22. Goetzmann, "Exploration's Nation."

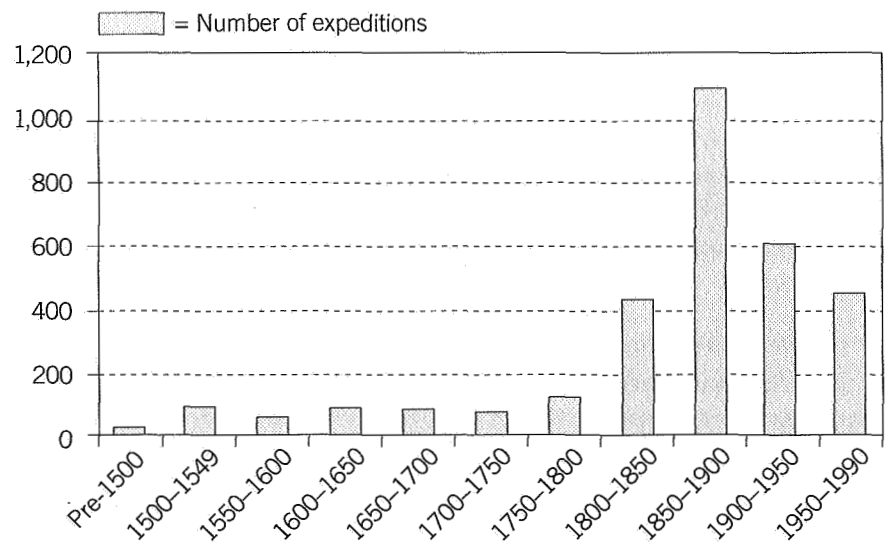
23. Accounts from the Heroic Age of Antarctic Exploration are legion. The entire literature is contained—incredibly—within the *Antarctic Bibliography* published by the Library of Congress. A surprisingly good compilation, wonderfully illustrated, is available in Reader's Digest, *Antarctica: Great Stories from the Frozen Continent* (Surrey Hills, New South Wales: Reader's Digest, 1985). For an interpretive summary that places the experience within the Three Ages of Discovery schema, see Stephen J. Pyne, *The Ice: A Journey to Antarctica* (Iowa City, IA: University of Iowa Press, 1986).

LOST WORLDS: THE WANING OF THE SECOND AGE

The reasons for the slow bursting of this exploration bubble are many. The simplest is that Europe had completed its swarm over the (to it) unknown surfaces of the planet. There was nowhere else for the Humboldtean explorer to go. Equally, there were no more lands to meaningfully colonize. Instead, Europe turned upon itself in near self-immolation, with two world wars, a depression, and the sudden shedding of its old imperium. The enthusiasm for boundary surveys and natural-history excursions—for imperialism itself—waned with the slaughter of the Great War.

The critical players were exhausted, especially Great Britain. The Second Age had kindled with a rivalry between Britain and France, much as the contest between Portugal and Spain had powered the First Age. Thereafter, virtually every competition featured Britain, which is why its explorers so dominate the age. Britain and France clashed in India, the Pacific, and Africa; Britain and the U.S., in North America; Britain and Russia, the Great Game, across central Asia; Britain and all comers in Antarctica. After the Great War, Britain and France

Great Ages of Discovery[24]



24. Data from J. N. L. Baker, *A History of Geographical Discovery and Exploration*, rev. ed. (G. G. Harrap and Co., 1937); Alex Roland, ed., *A Spacefaring People: Perspectives on Early Spaceflight* (Washington, DC: GPO, 1985); and J. H. Parry, *The Discovery of the Sea* (New York: Dial, 1974).

could no longer afford the enterprise; Russia turned inward with revolution; the U.S. had few places other than Antarctica in which discovery had geopolitical meaning. The Second Great Age of Discovery, like the First before it, deflated.

By the middle 20th century, Kipling's "Recessional" had become prophetic: Europe was rapidly disengaging itself from its imperial past and thus from the exploring energies that had, like lampreys, attached themselves to the institutions of an expansionist era. Decolonization accompanied an implosion of exploration; Europe turned inward, quelling the ancient quarrels that had restlessly and violently propelled it around the globe, pulling itself together rather than projecting itself outward. Antarctica, the deep oceans, interplanetary space—these arenas for geographic discovery might be claimed, but they would not be colonized. No one was willing to wage war over the asteroid belt or Io.

Other reasons were cultural. The Second Age had served as the exploring instrument of the Enlightenment. Geographic discovery had bonded with modern science: no serious expedition could claim public interest without a complement of naturalists, while some of the most robust new sciences like geology and biology relied on exploration to cart back the data that fueled them. Science, particularly natural history, had shown itself as implacably aggressive as politics, full of national rivalries and conceptual competitions, and through exploration, it appeared to answer, or at least could address, questions of keen interest to the culture. It could exhume the age of the Earth, reveal the evolution of life, celebrate natural monuments to nationalism and Nature's God. Artists like Thomas Baines and Thomas Moran joined expeditions or, like John James Audubon, mounted their own surveys; general intellectuals eagerly studied narratives of discovery (even Henry David Thoreau, nestled into his Walden Pond cabin, read the entire five volumes of the Wilkes Expedition). Exploring accounts and traveler narratives were best sellers; explorers became cultural heroes; exploration was part and parcel of national epics; exploration was a means to fame and sometimes fortune. The Second Age, in brief, braided together many of the dominant cultural strands of its times.

By the early 20th century, however, this splendid tapestry was unraveling. The Enlightenment found itself challenged by Modernism's avant-garde: in field after field, intellectuals turned to subjects that no longer lent themselves to explication by exploration. Modernism spread like an intellectual infection, a fever that turned the attention of high culture away from a tangible, commonsense world to an interior realm full of paradoxes. The vital truths no longer lay in the domain of geographic discovery. Art looked to art, mathematics to mathematics, literature to literature. Natural scientists scrutinized the very large and the very small, to red-shifting nebulae and subatomic particles or molecular genes. Artists turned inward, probing themselves and the foundations of art, not outward to representational landscapes. High culture was more inclined to follow Sigmund Freud into the symbol-laden depths of the unconscious or Joseph Conrad into

a heart of imperial darkness than to ascend Chimborazo with Humboldt or to row with John Wesley Powell through the gorges of the Grand Canyon. The Second Age sagged not simply from the exhaustion of closed frontiers, but from a more profound weariness with the entire Enlightenment enterprise.

In the early 19th century, an intellectual could claim international acclaim by exploring new lands. By the early 20th, he could not, if he could even find suitable lands. There were a few spectacular exceptions: the gold-prospecting Leahy brothers trooping into the unknown Highlands of New Guinea; Richard Byrd, wistfully erecting Little America on the Ross Ice Shelf; Roy Chapman Andrews, with carbine and Model T, whisking across the Gobi in search of dinosaur eggs, the very model of a Hollywood action hero (and inspiration for Indiana Jones). But there was, overall, a rueful, forlorn quality to the striving, aptly expressed when the American Museum of Natural History, with Andrews at the helm, dispatched an expedition to Shiva Temple, an isolated butte within the Grand Canyon, to look for exotic creatures. Sixty years before, the Canyon had claimed center stage, not only for geographic discovery, but for what it said to fundamental questions about the Earth's age and organic evolution. Now the press boosted a minor foray into a search for lost worlds and possibly living relics from the age of dinosaurs. Lost world, indeed.[25]

BOLDLY GOING WHERE NO ONE IS: THE THIRD AGE

The fascinating question is why the bubble did not burst more catastrophically. One reason is that Western civilization *did* discover new lands to explore. There were the ice sheets (and sub-ice terrains) of Greenland and especially Antarctica; there were the deep oceans; and, of course, a solar system beckoned, full of wonders beyond the vision of Earth-bound observatories. As powerful instruments and remote sensing technologies emerged, as manned vehicles and unmanned probes plummeted to the depths and beyond the atmosphere, the prospects for a revival of exploration became possible.

Yet dazzling technologies and a rekindled curiosity are not enough to sustain an era of exploration: cultural engagement also demands a sharp rivalry. Those competitive energies flourished with the Cold War. In retrospect, the Great Game between the United States and the Soviet Union lasted far less than

25. Contrast, for example, the classic explorers of the Second Age with the career of Roy Chapman Andrews, as described in Charles Gallenkamp, *Dragon Hunter: Roy Chapman Andrews and the Central Asiatic Expeditions* (New York: Viking, 2001). Andrews set out to be an explorer in the classic mode but found that the times had changed. For the story of a contemporary who did manage to make the transition in part, see Carol Gould, *The Remarkable Life of William Beebe: Explorer and Naturalist* (Washington, DC: Island Press, 2004). Beebe famously plunged into the Atlantic in a bathysphere. An attempt to trace the contours of the Second Age's rise and fall, using the Grand Canyon as a test site, can be found in Stephen J. Pyne, *How the Canyon Became Grand: A Short History* (New York: Viking, 1998), which recounts the Shiva Temple saga.

those between Spain and Portugal, or Britain and France, but the era is young, and if it does in fact mark a Third Age, some other competitors, keen to secure national advantage or prestige through sponsored discovery, may emerge. China has announced its intention to land a tikonaut on the Moon; India and Japan have launch capabilities and may choose to compete. Without the Cold War, however, there would have been scant incentive to erect bases on the Antarctic ice, scour the oceans for seamounts and trenches, or launch spacecraft. The Cold War allowed a controlled deceleration of exploring energies, a reversed complement to the British-French competition that helped accelerate the Second Age. Two geopolitical rivals, both with active exploring traditions, chose to divert some of their contest away from battlefields and into untrodden landscapes.

But perhaps more profoundly, exploration did not wither away because the culture, the popular culture, did not wish it to. Exploration had become not only institutionalized, but internalized. This was a civilization that could hardly imagine itself as other than exploring. Explorers flourished, if only in pulp fiction, movies, and adolescent fantasies. Quickly, it forged new institutions, of which the International Geophysical Year is an apt annunciation, and in the Voyager missions, it found what is likely to endure as the great gesture of the Third Age, a traverse through the solar system. Voyager's Grand Tour may serve for this era as Magellan's voyage did for the First and Humboldt's travels did for the Second. Voyager demonstrated both the power and peculiarities of the era.[26]

What has not happened is a new knitting together of exploration and high culture. Instead, popular culture has filled that void, but in ways that resuscitate the images and narrative templates of previous eras. *Star Trek*, for example, is the voyage of the *Beagle* with warp drive. Enthusiasts show Conestoga wagons

26. The literature on IGY is large but mostly technical. A good popular survey is J. Tuzo Wilson, *IGY: The Year of the New Moons* (New York: Knopf, 1961). The Third Age has not been the object of a comprehensive survey since space seems to command its own literature and, to put the matter bluntly, the concept is not widely known. Useful starting points for works about space travel are Alex Roland, ed., *A Spacefaring People: Perspectives on Early Space Flight* (Washington, DC: GPO, 1985); William Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998); Roger Launius, *Frontiers of Space Exploration,* 2nd ed. (Westport, CT: Greenwood Press, 2004); Roger D. Launius et al., *Reconsidering Sputnik: Forty Years Since the Soviet Satellite* (Amsterdam: Overseas Publishers Association, 2000); and, for the political context of the Cold War, Walter A. McDougall, . . . *The Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985). The deep-ocean story has been much less described, although declassification of military documents is beginning to change the record. See William Broad, *The Universe Below: Discovering the Secrets of the Deep Ocean* (New York: Simon and Schuster, 1997); Robert D. Ballard with Will Hively, *The Eternal Darkness: A Personal History of Deep-Sea Exploration* (Princeton, NJ: Princeton University Press, 2000); Henry Menard, *The Ocean of Truth: A Personal History of Global Tectonics* (Princeton, NJ: Princeton University Press, 1986); and *Anatomy of an Expedition* (New York: McGraw-Hill, 1969). To measure the contrast with the supreme oceanic expedition the Second Age, see Richard Corfield, *The Silent Landscape: The Scientific Voyage of HMS Challenger* (Washington, DC: Joseph Henry Press, 2003).

trekking to Mars, prairie schooners propelled by solar wind. But popular culture can be fickle and selective. The first *Star Trek* movie, for example, imagined a Voyager spacecraft returning to Earth, stuffed with a universe of wonders, reporting to its "creator." Ten years later, *Star Trek V* opened with a bored Klingon commander blasting a Voyager probe as space junk. Exploring the galaxies needed a story—a deep narrative of moral and imaginative power—as much as dilithium crystals. With neither a rambunctious imperialism nor an eager Enlightenment, the Third Age must, for now, continue its downward declension.

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There are good reasons, then, for considering the Third Age—our age—as continuous with its predecessors. Yet it is also different, and those differences matter. Most intrinsically, the Third Age is going where no one is or ever has been.

The geographic realms of the Third Age are places where people cannot live off the land. In Antarctica, they can at least breathe. In the deep oceans, beneath the ice sheets, or in space, they can survive only if encased in artificial life-support systems. These are environs that offer no sustaining biota. There is little reason to believe that much more thrives beyond Earth. These geographies remain, for all practical purposes, abiotic worlds. They propel exploration beyond the ethnocentric realm of Western discovery, but also beyond the sphere of the human and perhaps beyond the provenance of life.

This is a cultural barrier to exploration, in comparison to which the limiting velocity of light may prove a mere technological inconvenience. The reason goes to the heart of exploration: that it is not merely an expression of curiosity and wanderlust but involves the encounter with a world beyond our ken that challenges our sense of who we are. It is a moral act, one often tragic, a strong nuclear force that bonds discovery to society. It means that exploration is more than adventuring, more than entertainment, more than inquisitiveness. It means it asks, if indirectly, core questions about what the exploring people are like.

This was unavoidable in the past because almost all previous encounters had involved people. Exploration meant the meeting of one people with another, the transfer of knowledge and experience from one group to another. Most of the world Europe did not discover, except to itself. Almost every place that could have people did have them, and those indigenes proved indispensable. They served as interpreters, translators, native guides, hunters, and collectors. Explorers often succeeded to the extent that they borrowed from or emulated the peoples who already resided in these (for Europe) far and foreign realms. What Europe did was to stitch these separate someones together into a vast cosmological quilt: its voyages of discovery were needles and threads that joined geographic patches into new collective patterns.

The Third Age has no such option. No one will live off the land on Deimos, go native on Titan, absorb the art of Venus, the mythology of Uranus, the religious precepts of Mars, or the literature of Ceres. There will be no one to talk to except ourselves. Discovery will become a colossal exercise in self-reference. Consider some of the iconic images of the American space program. There is the image of Earthrise, which is a view of ourselves from the Moon. And there is Buzz Aldrin, encased like a high-tech Michelin Man, staring into a camera on the lunar surface. His visor, however, reflects back the image of the photographer. In a classic image, *Wanderer Above a Sea of Fog*, Caspar David Friederick could position his painting's observer peering over the shoulder of a Humboldtean traveler, in turn overlooking a valley of mist. In a comparable classic, Neil Armstrong could photograph Aldrin, looking at Armstrong, showing the photographer taking the photograph. That shift in perspective captures exactly the shift from Enlightenment to Modernism and from Second Age to Third. Add to the survey the curious plaques affixed to Pioneer and Voyager, surely indecipherable to any entity that might find them. They are a message in a bottle dispatched to ourselves.

Yet there is promise amid the paradox. For a century, Modernism has grappled precisely with how to reconcile observer with observed, with somehow putting ourselves into the scene. Russell's paradox, Godel's proof, Heisenberg's indeterminacy principle—all struggled with self-reflexivity. They addressed precisely, if abstractly, the conundrum of exploring without an Other. As a result, Modernist art, literature, and philosophy can outfit exploration with the intellectual kit it will need to survive such alien scenes and self-encounters. They can provision it to move beyond the landscapes of earlier eras of discovery.

The other good news is that the coruscating ethical dilemmas of so much earlier exploring and empire-building will disappear. No group need expand at the expense of another. Ethnocentricity will vanish: there is only one culture, that of the explorer. There is no exoecosystem to foul. With no distinctively *human* encounter possible, there is no compelling reason for humans to even serve as explorers. As long as other life or cultures are not present, there is no ethical or political crisis except whatever we choose to impose on ourselves. Beyond the Earth there may well be no morality as traditionally understood, that is, as a means of shaping behavior between peoples. The morality at issue is one of the self, not between the Self and an Other.

The bad news is that exploration's moral power—the tensions, awful and enlightening both, that are involved in a clash of cultures—also vanishes. The price of ethically sanitizing exploration is to strip it of compelling *human* drama. Planetary probes become technical challenges, to make machines to withstand the rigors of space travel, a technological equivalent to extreme sports, like white-water kayaking in Borneo or NASCAR's Daytona 500. The intellectual

challenge has telescoped, more or less, into a search for life, notably on Mars. Whether this can command the kind of cultural attention that earlier exploration did is unclear. What is inescapable is yet another paradox: we are safe as long as we don't find life. If we do, then the old morality returns. (Here is the real intergalactic ghoul.) If we decline to revive those concerns, and withdraw, then the primary justification for continued discovery vanishes and the space program becomes a kind of national hobby, a jobs program, or a daytime TV soap opera. But the matter gets even worse.

In past ages, discovery *had* to be done by people. There was no other option by which to learn the languages, to record data and impressions, to gather specimens, to meet other societies and translate their accumulated wisdom. It is impossible to imagine the great expeditions of the past without considering the personality of individual explorers who inspired, collected, witnessed, fought, wrote, sketched, exulted, feared, suffered, and otherwise expressed the aspirations and alarms of their civilization. But it is entirely possible to do so now. Not only is there no encounter between people, there need not even be a human encounterer. People do not have to be physically present at the discoveries of the Third Age, and there are sound reasons for arguing that they should not be.

Nor is the case for planetary colonization truly compelling, not at present, any more than it was for Magellan at the Marianas or Peary at the Pole, or those fatally premature experiments from promoters like Walter Raleigh. The theses advanced to promote outright settlement are historical, culturally bound, and selectively anecdotal: that we need to pioneer to be what we are, that new colonies are a means of renewing civilization, that the Second Age can have a Second Coming. America, in particular, could not survive the closing of the final frontier (although the American Century flourished only after the old frontier nominally shut down).

There is little to justify this assertion. Even considered on economic grounds, Europe's imperial nations boomed only after they shed their foreign colonies. Moreover, advocates for exploration as a prelude to colonization conveniently ignore such fiascos as the Darien debacle—the scheme boosted by William Paterson in the 1690s to establish a Scottish settlement in Panama. The isthmus would be critical to global trade, he insisted; Scotland's economic future and national identity depended on it seizing control of that geopolitical chokepoint; destiny demanded colonization. The outcome was a crushing failure that, not incidentally, bankrupted Scotland and drove it into union with England. Paterson was a visionary: in 200 years, a canal would join the two oceans across Panama. He was also a lethal crank who cost hundreds of lives and ruined a national economy. Successful settlements followed a long gestation period of reconnaissance and aid from indigenes. Examples abound of societies that chose to withdraw into themselves and suffered. There are, equally, examples of societies that chose to push outward and suffered. Portugal, as the founding

paradigm, is a good case. Within a generation, it had sunk into collapse, even absorbed by Spain, only emerging fully as a modern state when it finally shed its colonies. The issue is not whether to explore or not, but how to engage the wider world: where, with what means, how much. More likely is an era of space tourism or historical reenactment—Plymouth Colony on the Moon, Golden Goa on Venus, Magellan Tours Takes You to Phobos.[27]

This is precisely what the closest Earth analogues do. No one lives in the Marianas Trench or the Laurentian Abyss. No one homesteads in Antarctica. There are permanent settlements, but not permanent residents. There are no schools because there are no children. There are no families. There is no indigenous society. These enclaves are the scientific equivalent of the commercial and military posts that characterized the early centuries of European expansion, only a fraction of which ever evolved into full-blown colonies, and most of those in defiance of the wishes of the commercial joint-stock companies or royal monopolies that oversaw them. In some ways, the contemporary colonies of the Third Age on Earth offer even less because there are no indigenes with whom to co-inhabit, interbreed, or coerce into labor. (The historic outposts of Europe's exploring imperium tended to be populated by indentured servants, slaves, serfs, soldiers, convicts, religious refugees, or company employees, most of whom survived thanks to the largesse or forced conscription of native peoples; all in all not a formula for the demographic renewal of Earth.)

Within the realm of the solar system—the dominion of the Third Age—the likelihood is that posts, if established and staffed by humans, would involve short tours of duty and high turnovers. The infrastructure would remain; the people would not. Exploration could thrive; outright colonization would not.

BACK TO THE FUTURE: BEYOND THE THIRD AGE

The Third Age encompasses more than space exploration, but the Antarctic has not enough undiscovered terrain to sustain a whole era, and oceanographic exploration has not yet gripped the public imagination, although it might. The future of exploration will depend on the exploration of the solar system. What might it look like?

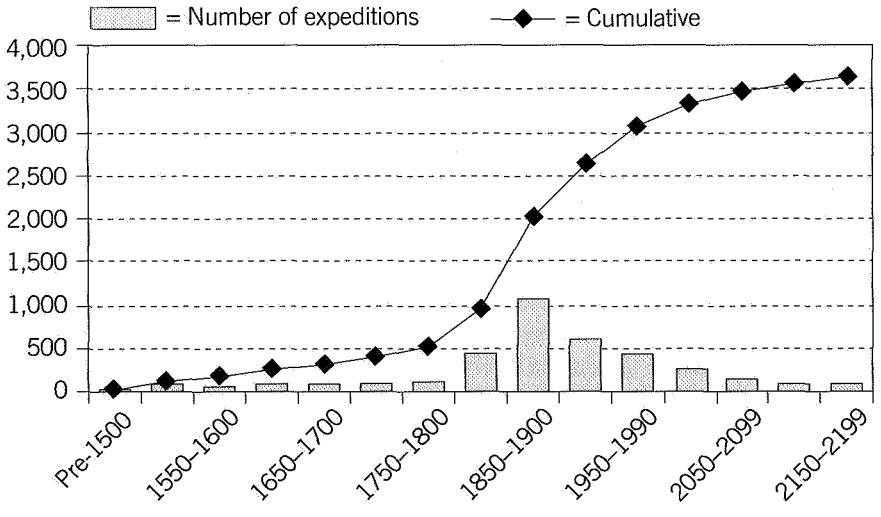
It will look like what its sustaining society wants it to look like. The possibility exists that political contests will boil over into space, perhaps if China declares a colony on the Moon as essential to its prestige and the European Union joins the

27. For a thumbnail of the Darien fiasco, see Arthur Herman, *How the Scots Invented the Modern World* (New York: Three Rivers Press, 2001), pp. 15–37. Interestingly, several nations tried to gain a foothold in Panama and failed, including the United States in the 1850s.

fray, using space as an alternative to military might in the search for a multipolar world. There is a prospect that the search for life will take on an imaginative, even a theological cast, sufficient that a large fraction of the culture wants to pursue it among the planets. It may happen that extreme arts, brash new sciences, an as-yet-undeveloped commerce, an astropolitics, and some critical personalities will combine to kindle a Third Age echo of the Second Age. In some form or another, a virtuous cycle is possible. But it is not likely. For the American economy, the world's greatest debtor, cyberspace is far more significant than outer space. Like Spain before it, the United States squandered its windfall. Something might reverse that slide, but as Damon Runyon advised, the race is not always to the swift nor victory to the strong, but that's where you place your money.

The most plausible prognosis is that the future will resemble the past, that the Second Age's monadnock will mark an axis around which the evolving contours will unfold with rough historical symmetry. The Third Age will resemble the early Second, though in reverse, eventually mimicking with high-tech hardware the tempo of the First. (Even the attrition of spacecraft resembles that of far-sailing mariners.) Expeditions will slide to a new steady state, perhaps on the order of one or two a year (see figure below). These will be complicated probes, requiring years of preparation, similar to the expeditions launched during the Great Voyages and

A Prospective Future for Exploration



quite unlike the brawling swarm that so inflated the Second Age. The motor for the past half millennium of exploration—Europe's internal quarrels—is now directed inward, to the European Union, or in absorbing rivalries that once drove exploration outward. Such expeditions will be targeted to some particular purpose—commercial, scientific, technological, national prowess, and prestige. They are unlikely to spill out from colonization: they will rather resemble those expeditions that early established trading factories on islands or episodically visited coastlines for barter or sought out new routes. If the process thrives, there will be several rivals, not some collective United Earth Space Agency, and that institutional unrest is what will keep the pot simmering. Steadily, more and more of the solar system will be visited, cataloged, mapped, assessed. Perhaps, here and there, an outpost will appear, staffed for a few years. Reversing this trend would require an immense, global commitment that could only come from some dark necessity or irresistible rivalry, say, the discovery amid the asteroids of some mineral absolutely vital to national existence—the equivalent of the Potosi mines of Mexico, perhaps—or from Venusians announcing that they intend to colonize Mars and the moons of Saturn, and defying Earthlings to stop them.

What might all this portend for NASA? It likely means that exploration will continue to command popular interest, that scientific pursuits may well be sufficient to justify the further exploration of the solar system, with curiosity replacing commerce as a motive force and modern science substituting its own fierce competitive for geopolitical rivalry, and that the cultural continuities inherent in the long trajectory of geographic discovery by Western civilization will persist. For the near future, exploration's own inertia will propel more exploration. But the interpretation also argues that NASA would do well to attend to the differences. It suggests that trekking among the planets will not be the same as crossing a continent or sailing the seas. The distinction is not simply one of technology and vessels, but of psychology and the meaning, ultimately the morality, of what occurs. It suggests that in the future, expeditions will be complex, public commitment modest, and the vigor of the program measured not by the number of expeditions so much as the impact of their novelty. It suggests, as so much other evidence does, that the Apollo program was an aberration and the attempt to institutionalize a successor through the Space Shuttle, an anomaly. It suggests that the chief novelty unveiled by space travel will be the character of exploration itself, that the explorer may be—ought to be—robotic and virtual. It is, in truth, more than a little odd that an enterprise premised on the discovery of the new should be so obsessed with retaining the old, especially cultural archaisms. The vital requirement for future exploration is less a new propulsion mechanism than a new appreciation for how geographic discovery must proceed in a context beyond Earth. Eponymously named spacecraft and planetary rovers may be the future's prosthetic explorers. An obsession with colonization will be a burden rather than a boon.

There may even be a deeper symmetry in the narrative arc of the Great Ages of Discovery. The Grand Ages may themselves end. They were created; they can

expire. The conditions that sustained them may cease altogether; they may no longer inspire interest as a tradition worthy of institutional support. One can even imagine a robotic Columbus, ceremoniously announcing an end to the enterprise. If the late 19th century marks a bilateral middle in this saga, that passing may happen some 400 years later, the early 23rd century, where *Star Trek* now resides in the popular imagination. Exploration, even of space, may then exist only in literature, history, film, and popular imagination, and in a past where no one, boldly or otherwise, wishes any longer to go.